KERR MEASUREMENT SYSTEMS, INC.
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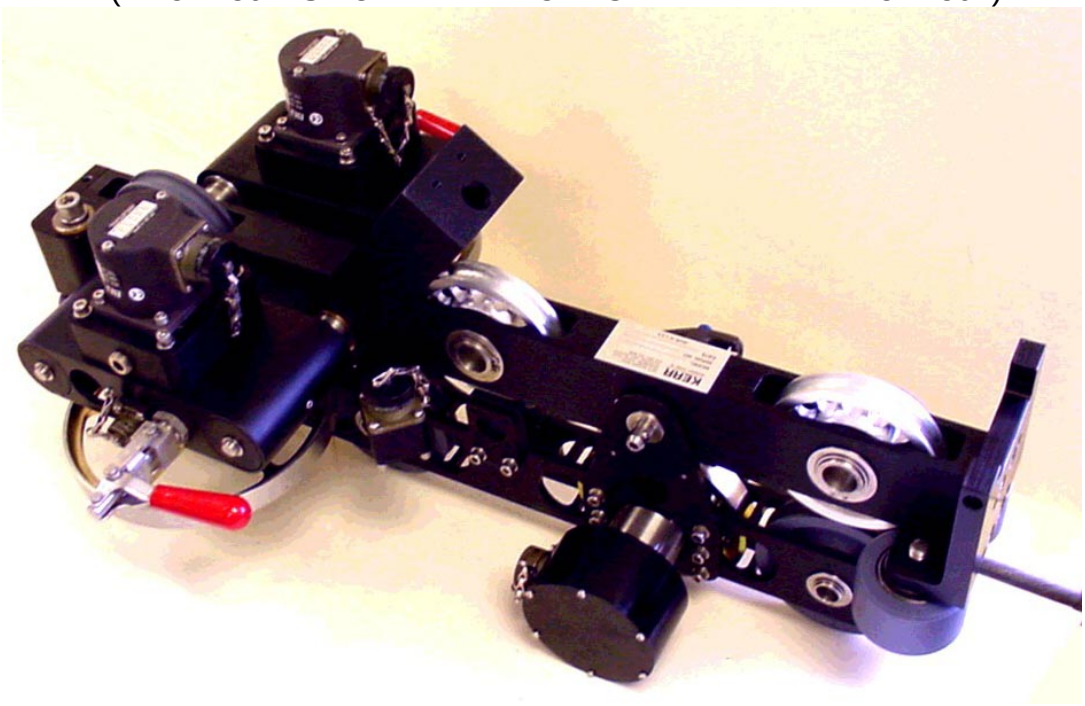
AM5K COMBINED DEPTH/TENSION MEASUREMENT DEVICE

ATEX ZONE 2 CE

HALLIBURTON ENERGY SERVICES CONFIGURATIONS

AM5KA512 one encoder, no MMD (CH) SAP # 101321352
AM5KA502 dual encoders, MMD (OH) SAP # 101286954 - **OBSOLETE**
REPLACED BY
AM5KA507 dual encoders, MMD (OH) SAP # 101281049 (OH ZONE 2)
(AM5KA507 IS FULLY INTERCHAGEABLE WITH AM5KA502)



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Manual Revision Log

Current Revision N Sep 2006

Changed references of flat tension wheel to shallow groove tension wheel

Current Revision: M Aug 2006

Pages 10 – 11: Added information on the shallow and deep grooved tension wheels

Pages 19 – 21: Added information on installing tension wheel

Changes from L to M revision

Pages 6-7: Updated spooling arm mounting information

Page 9: Added ratchet strap for removing cable while under load

Page 17: Added removal procedure for encoder mount and front wheel

Page 22: Swapped SAP numbers between items 33 and 36

Page 29: Updated encoder drawing

Changes from K to L revision

Pages 1, 17, 22, 25-36: Added zone 2 information

Changes from J to K revision Mar 2005

Page 17: Updated recommended spare parts list and added information about previous revisions and part numbers.

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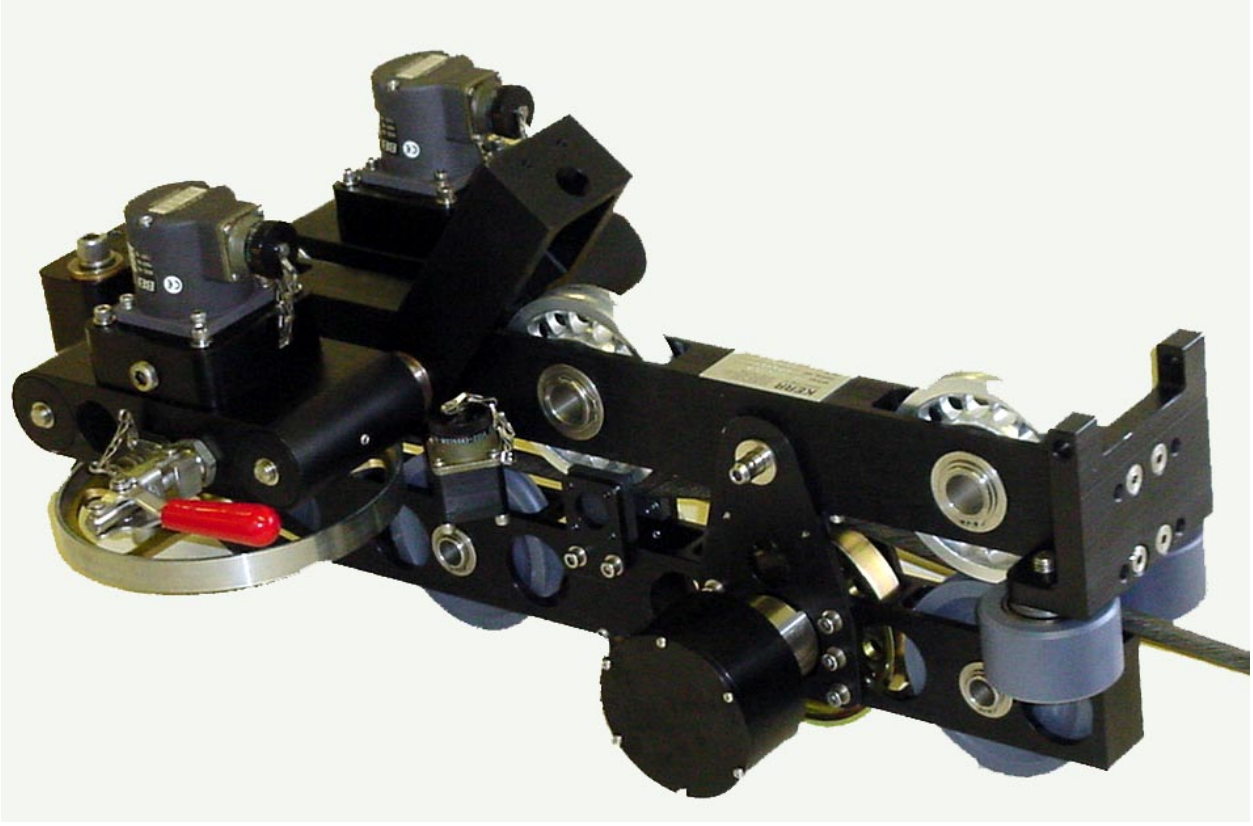
1.0 GENERAL

The Kerr AM5K Wireline Measuring Device is a compact and lightweight device for measuring both wireline depth and tension. The device is designed to be mounted to the spooling arm of a wireline unit. It is unique to other measuring devices in that it measures both depth and tension on wireline cables from .190” to .494”. This device will work on both open and cased hole wireline units which allows standardization on a measuring head for all types of operations.



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FEATURES AND BENEFITS:

- **Straight-line measurement (cable sizes can be changed without affecting measurement)**
- **Dual Tangential Measuring Wheels made from specially hardened steel**
- **Accepts cable sizes from .190" to .494" diameter (4.8 mm to 12.55 mm)**
- **Lightweight design with integral tension makes the device ideal for high angle rigups**
- **Device opens up to provide easy cable installation and removal, by removing a single pin**
- **Includes both horizontal and vertical guide rollers to minimize measuring wheel loading**
- **Rollers are oversized to increase reliability and reduce maintenance**
- **Guide rollers are made from composite material to reduce weight and cable wear**
- **Rear or Center spooling arm mount to minimize head "jerking"**
- **Tension Load Axle and amplifier can be configured for different outputs.**
- **Digital Magnetic Mark Detector**
- **Accepts single or dual encoders**
- **Supports fully independent backup depth measuring system using a magnetic pickup**
- **Backup depth system reduces drag on measuring wheel by eliminating mechanical drive cable**
- **Encoder, Mark Detector, and Tension amplifier certified for Zone II area use**
- **Anodized aluminum frame. All steel parts are plated or SST**

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2.0 SYSTEM DESCRIPTION

DEPTH MEASUREMENT:

The AM5K Measuring Head uses dual spring-loaded measuring wheels to measure the amount of wireline moving to and from the borehole. The measuring wheels are coupled to one or two optical encoders that transmit electrical signals via a cable to the hoistman's panel and/or logging computer. An independently powered magnetic encoder is used for back up depth indication.

The hardened measuring wheels are 2.0000 ft. (.609600 m) in circumference. Springs are used to hold the measuring wheels in contact with the wireline. The springs are sized to provide the appropriate friction between the wheels and wireline. The frame members are anodized 6061-T6 aluminum.

Under ideal conditions, without magnetic marks, the measuring heads have an accuracy of +/- 3 m in 3000 m (10 ft in 10,000 ft.). With magnetic marks and accurate line stretch calculations, an accuracy of .3 m in 3000 m (1 ft in 10,000 ft) can be achieved. The Kerr Hoistman's panel is required to fully utilize the Kerr mark detection and stretch correction algorithms.

TENSION MEASUREMENT:

Power Requirements:	12 vdc excitation	
Interface:	Kerr proprietary circuit board which buffers the load pin signals and provides a 3mv/v output	
Temperature stability:	<= .015% full scale / deg F on zero	
	<= .02% full scale / deg F on output	
Accuracy:	Within 150 lbs or 3% of actual, whichever is greater	
Maximum load (tested):	16,000 lbs	7,258 kg
(theoretical):	20,000 lbs	9,072 kg

GENERAL SPECIFICATIONS:

WEIGHT:	58 lbs	26.3 kg
LENGTH:	26.5”	673 mm
HEIGHT:	10.8”	274 mm
WIDTH:	15.3”	389 mm
MAXIMUM TENSION:	20,000 lbs	9072 kg
MEASURING WHEEL SIZE:	24.000”	609.60 mm
CABLE SIZES:	.190” to .494”	4.8 mm to 12.55mm

CABLE BEND OVER TENSION WHEEL: 2.5 – 7.5 degrees (depends on cable)
Minimal or no affects on magnetic marks

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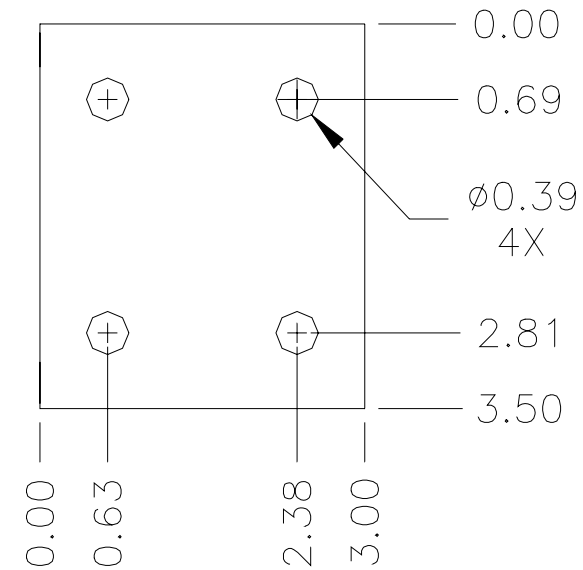
3.0 OPERATION

3.1 SPOOLING ARM INSTALLATION – OVERHEAD SPOOLING ARM

Install the measuring head on to the spooling arm by using the top adapter mount assembly to mount to an overhead spooling arm. The mount is designed to mount with a standard U-joint yoke.



MOUNTING PLATE DETAIL

MOUNTING YOKE

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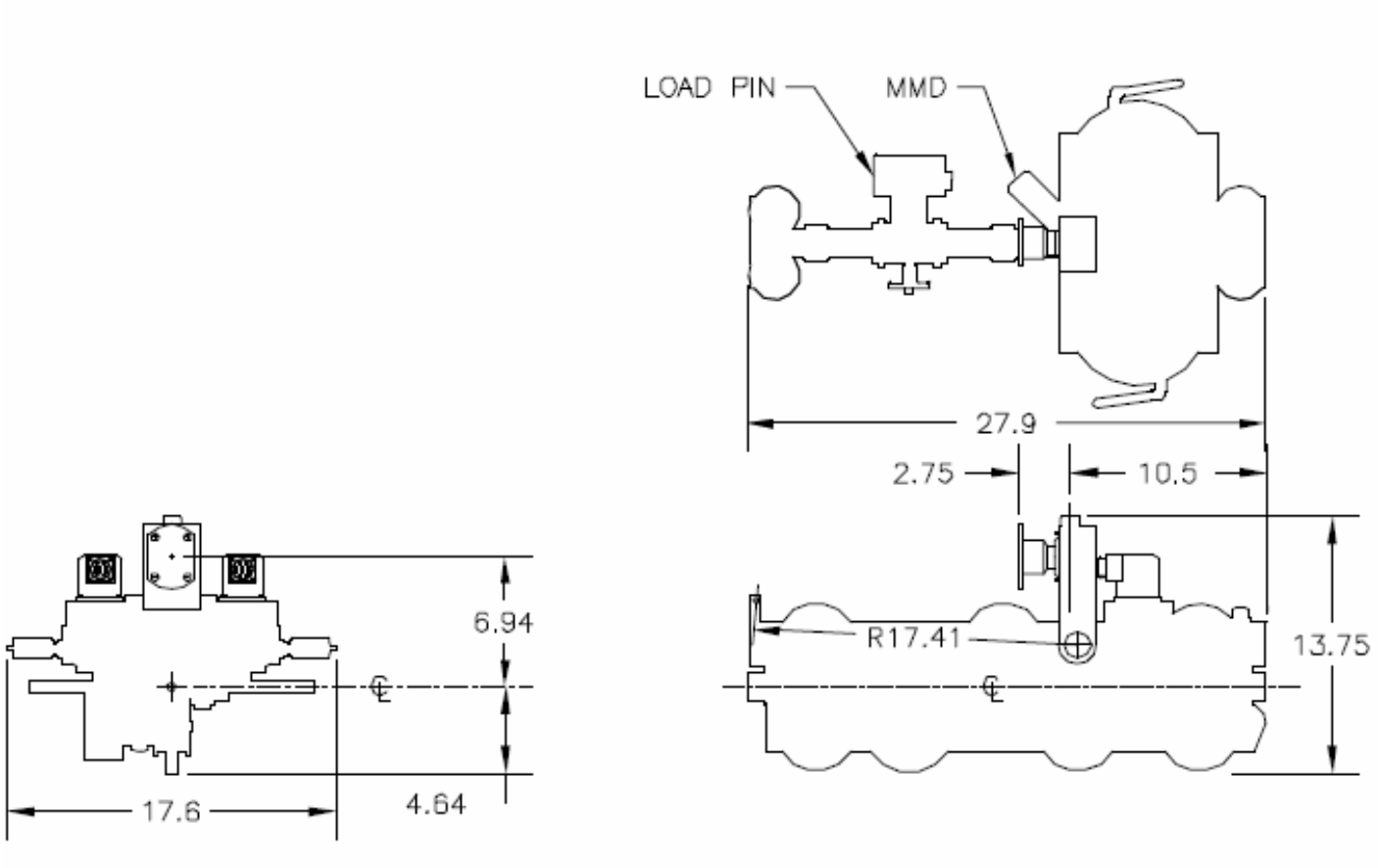
Make sure that the head can freely sit on the wireline. If the mounting arrangement will not let the head travel up and down freely and if the cable puts a upward or downward force on the measuring head, this force will cause an offset to the tension measurement which will result in an incorrect tension reading.



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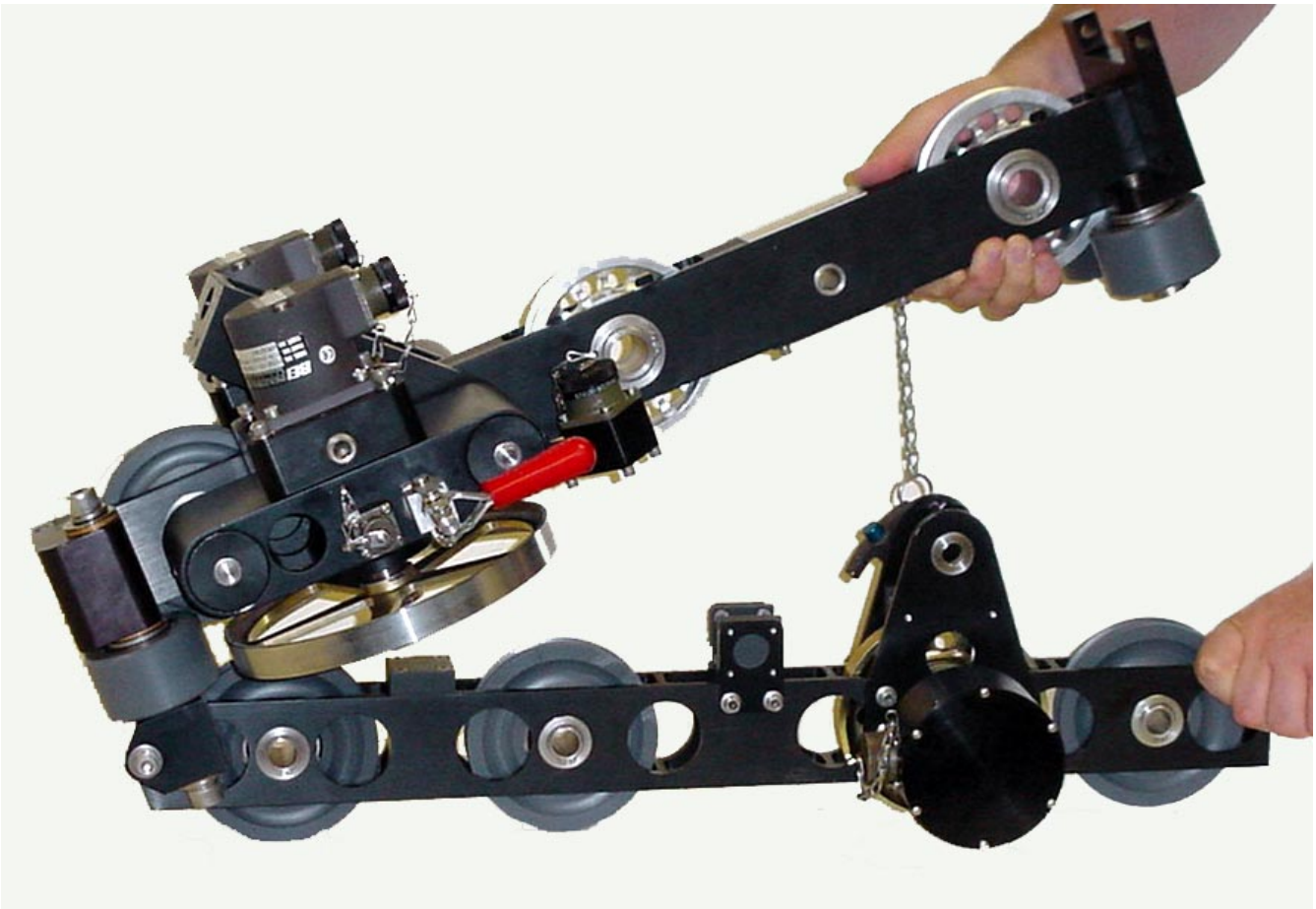
3.2 CABLE INSTALLATION

To install cable, first open the wheels by shifting the red release handles.

Next, remove the push pin, and hinge the head open.

Lifting up on the wireline cable makes it easier to remove the push pin.



The cable can now be inserted or removed.

Close the red release handles to tighten the wheels against the wireline.

Swing the head closed and reinsert the pin.

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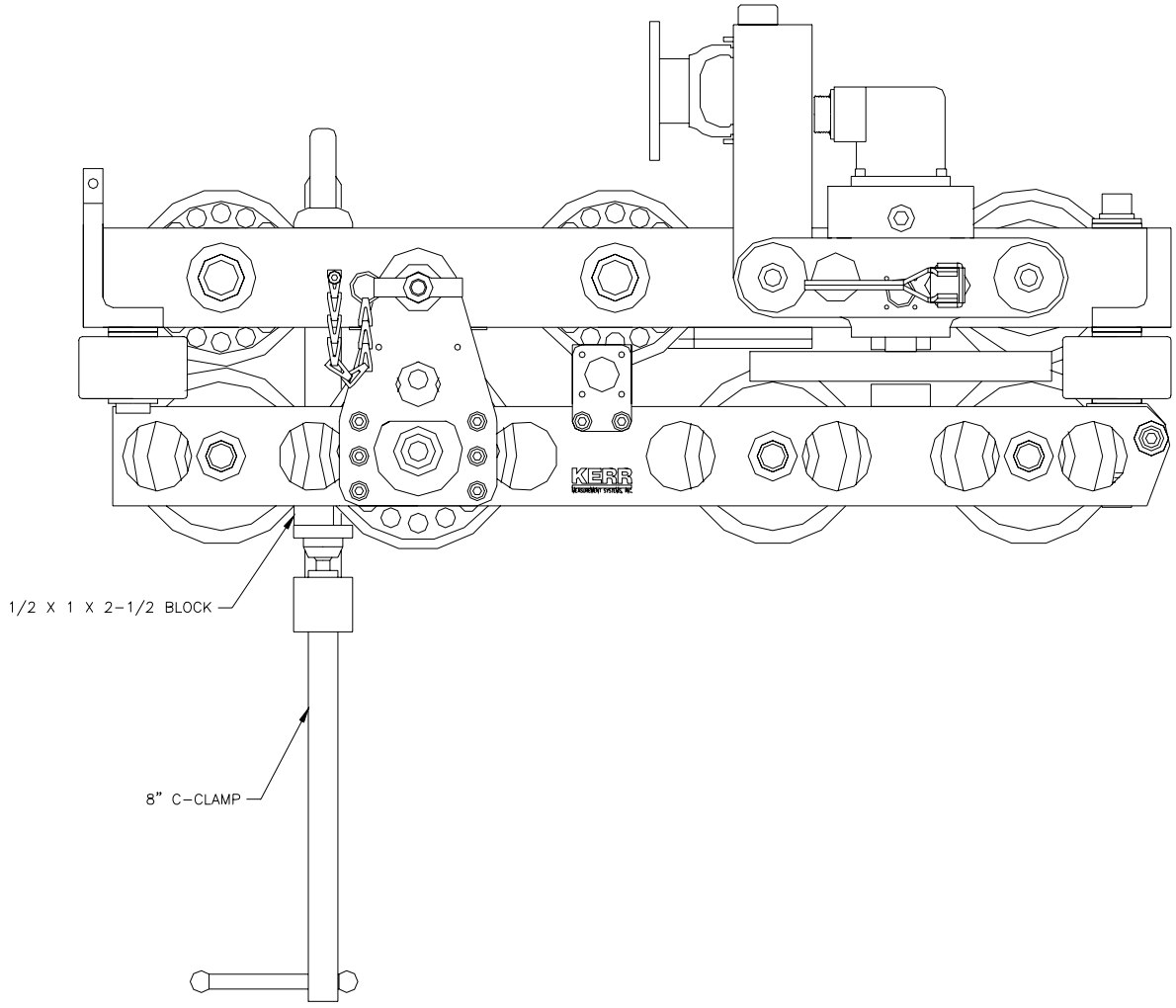
3.3 CABLE REMOVAL UNDER LOAD

3.4.1 If under load, the load will need to be removed from the device prior to removing the retaining pin. A “C-clamp" or a nylon "ratchet strap" can be used to remove the load.

3.4.2 Install a C-Clamp across the top and bottom frames as shown in the drawing below. The ratchet strap can be installed in a similar way.



3.3.3 Tighten the C Clamp until the load is removed from the retaining pin. Remove the retaining pin then loosen and remove the C Clamp.

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3.4 CHANGING CONFIGURATION BETWEEN OPEN HOLE AND CASED HOLE

A measuring head configured for open hole will typically contain a magnetic mark detector and a 2nd encoder. Cased hole operations rarely require a magnetic mark detector and typically use only one encoder.

If the head is configured for open hole, no changes are required to run it on a cased hole unit. You may elect to remove the magnetic mark detector if you have no plans to use the head on an open hole unit any time in the near future.

The cased hole head can be configured with a different wear plate. The cased hole wear plate is thicker and stepped on one end to the keep the line from riding near the top of the wheels. This can occur when going in the hole with a small cable (7/32") with a very light load. The open hole wear plate is flat. Both plates are made from hardened tool steel. The wear plate is mounted on the upper frame above the measure wheels.

Part number for the open hole wear plate is: AM5KM034
Part number for the cased hole wear plate is: AM5KM074

3.4.1 To remove the magnetic mark detector, refer to item 12 of drawing 6.2. Remove the four screws holding the detector in place then remove the detector. To install a magnetic mark detector, reverse this procedure.

3.4.2 To remove an encoder, remove the four screws securing the encoder adapter to the head. Remove the encoder and adapter. Remove the coupling from the measuring wheel shaft.

3.5 INSTALLING THE DEEP GROOVED TENSION WHEEL

3.5.1 A Deep Groove High Load tension wheel is available for use when line tension greater than 12,000 lbs is commonly encountered. This wheel has a deeper groove to better support the wireline at high tensions. The deep groove also reduces the radius of the wheel which lowers the bend angle of the wireline.

This wheel is only for use with .472 Slammer or .494 Super Slammer cables and cannot be used with smaller cable sizes. For cables larger than .472, the severe load tension wheel should be used.

The normal wheel can be used at high loads for short pull durations but should not be used when loads exceed 12,000 lbs for an extended period of time.

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3.5.2 To install the High Load tension wheel, replace the standard shallow grooved tension wheel with the deep grooved tension wheel. The load pin does not need to be changed. To account for the decreased bend angle of the cable, the Load Cell Angle value will need to be changed from 0 to128 for .472 cables and changed to 121 for .490 cables. The SDDP calibrate value should remain at 3250. The High Load tension wheel can be ordered from Kerr Measurement Systems Inc. by part number AM5KA073. This kit includes the Tension Wheel, and bearing. It can easily be installed in the field.

Ensure that the slot in the bushing of the tension wheel is aligned with the roll pin on the side of the frame. The roll pin is only installed on one side of the frame and it needs to be inserted in the slot.

DEEP GROOVED HIGH TENSION WHEEL

STANDARD SHALLOW GROOVED TENSION WHEEL

Note: The shallow grooved tension wheel is a direct replacement for the flat tension wheel. The diameter of the wheel at the bottom of the groove is the same diameter of the flat wheel. No change in load cell angle is needed.

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3.6 SYSTEM OPERATION

3.6.1 Determine cable size to be used – .484" to .190". Since the wireline cable actually bends around the tension wheel, the bend radius of the wireline cable will affect the tension measurement.

3.6.2 Enter tension calibrate factor. These corrections are automatically made in the Kerr hoistman's panel by selecting the proper cable size using the menu. If a different panel is used, enter the tension factor at this time.

SDDP Calibrate Values:

VALUES	CABLE SIZE
3250	15/32" through .472"
3480	7/16"
4171	3/8"
4656	5/16"
4808	9/32"
6187	7/32"

"Comprobe" Calibrate Values:

VALUES	CABLE SIZE
10000	15/32" through .472"
10700	7/16"
12800	3/8"
14300	5/16"
14800	9/32"
19000	7/32"

SDDP Load Cell Angle

Standard Shallow Groove Tension Wheel = 0
.472 cable with Severe Load (Deep Groove) Tension Wheel = 124
.484 cable with Severe Load (Deep Groove) Tension Wheel = 120
.490 cable with Severe Load (Deep Groove) Tension Wheel = 118

3.6.3 Install line in measuring head. (refer to section 3.2)

3.6.4 Make sure line is laying slack and head is free to move. Press the Ten Zero Cal button and tension value should read 0.

3.6.5 Press the Zero Depth button to set the depth to zero when the tool is hanging at the zero point.

3.6.6 Simultaneously press the enable and zero button on the backup display panel at this time to set its zero.

3.6.7 At this point, the system is ready to log. Watch for visual indications of problems such as excessive vibration, wheel or roller slippage or lockups that signify bearing or shaft failures, or cable tracking problems.

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4.0 MAINTENANCE AND REPAIR

4.1 PRE-JOB CHECK

Each time the system is used perform the following steps:

Verify that the AM5K is properly and securely attached to the spooling arm. Several different mounting kits are available for different types of spooling arms.

Verify that the depth measuring wheels are clean and that no groove has been worn into the measuring wheel surface. Check the measuring and guide wheels for looseness, play, out-of-roundness, worn or rough sounding bearings, or other mechanical conditions that could affect measurement accuracy. Ensure that the wheel bearings inner race is not spinning on the shaft and that the shaft is not spinning in the bushings.

Verify that all fasteners are tight and that the ball lock pushpin is secure. Verify that the encoder, electronic load pin, and backup counter cable are installed and properly routed. Verify that the depth system is working by turning the wheel and observing the hoistman's panel and backup display unit to indicate cable movement. The hoistman's panel and backup display should measure 2' for each rotation of the wheel. If more than one encoder is installed check both encoders by turning each wheel and verifying that the hoistman's panel will read 2' for each rotation of either wheel.

4.2 POST-JOB MAINTENANCE

At the completion of each job, thoroughly clean and dry the device as soon as possible. This avoids problems caused from borehole residues transferred from the wireline onto the measuring device. Borehole residues should be washed from the device with a cleaning solvent such as Varsol or an equivalent type. Rinse the device with water, dry, and wipe down with an oily rag.

<u>Do not pressure wash</u>

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4.3 MONTHLY MAINTENANCE

Visually inspect the interiors of the electrical connectors for the encoders and electronic load axle for dirt and evidence of insulation breakdown. Clean or replace as necessary. Install dust caps on the connectors if the cables are removed.

Manually rotate each wheel by hand to verify its condition. Inspect the depth measuring wheels for signs of abnormal wear, diameter changes, or shaft/bearing play that can affect measurement accuracy. The wheel should be replaced if it is grooved more than .005". The wheel should be 7.639 / 7.640" (194 mm) in diameter with a 24" circumference (609.6 mm).

Inspect the tension wheel for signs of abnormal wear, diameter changes, or shaft and bearing play that could affect measurement accuracy. It should be replaced if it is grooved more than .030". The flat tension wheel should be 5" (127 mm) in diameter. The grooved tension wheel (severe load) should be 4.375" in diameter (bottom of groove).

Inspect the two grooved guide wheels on either side of the tension wheel. They should be 4" (101.6 mm) in diameter (bottom of groove).

Grease all the wheels and bearings that are fitted with a grease fitting (see following diagram). Use a water proof, marine grade grease. An inverted grease nozzle (Kerr p/n AM5KP130) is supplied with each head. This nozzle will fit any standard grease gun.

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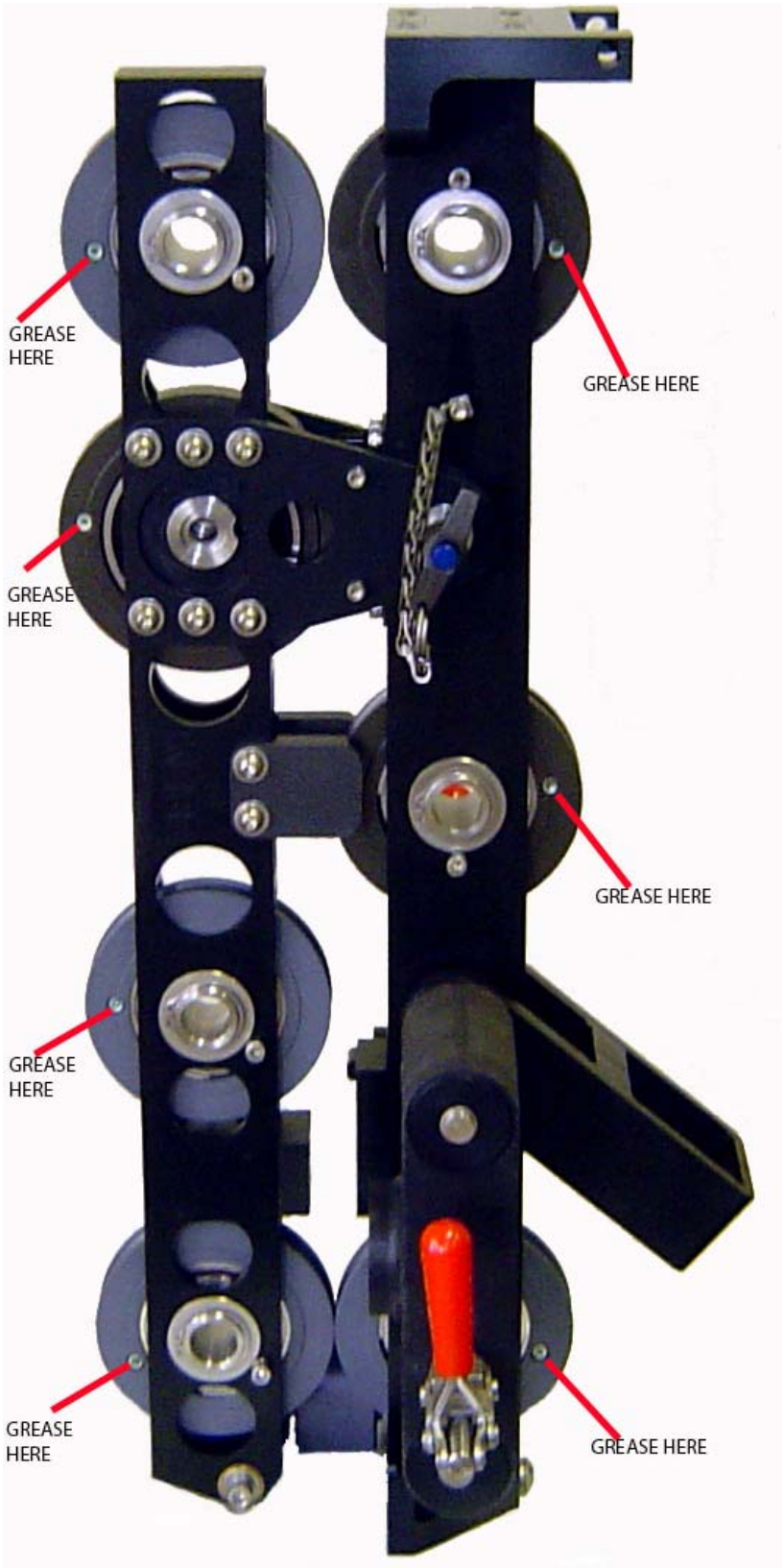

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4.4 ASSEMBLY / DISASSEMBLY PROCEDURES

4.4.1 MEASURING WHEEL, SHAFT, AND BEARING REMOVAL

Either measuring wheel can be removed from the measuring head. First shift the red release handle to move the wheel away from the frame. Next remove the encoder with its adapter.

On the later model heads, the wheels are keyed onto the shaft and can be removed simply by removing the screw holding the wheel to the shaft.

On earlier model heads, the wheels are pressed on to the shaft. The lower snap ring between the wheel and the bearing must first be removed. Pull the wheel and shaft from the mount. Reassemble in the opposite order. The bearing should also be replaced at this time.

4.4.2 ELECTRONIC LOAD PIN REMOVAL

The electronic load pin is held in place by one retaining ring on the outer end of its shaft. Remove the retaining ring. The load pin can then be removed from the mounting frame.

4.4.3 BACKUP DEPTH MAGNETIC PICKUP REMOVAL AND INSTALLATION

The backup depth magnetic pickup is mounted to the encoder adapter. It is held in place by four screws. Remove the screws and the pickup can then be removed. The pickup must be properly oriented to work correctly. The slot should be oriented to the top. The top side is the encoder side. Ensure that an o-ring is inserted between the plastic housing and the mount. An additional o-ring is used between the connector and the housing to keep moisture out.

If the backup display is counting backward (i.e. counting negative when going downhole), simply rotate the pickup 180 degrees to change the direction.

4.4.4 ENCODER COUPLING INSTALLATION

To install the encoder coupling, first remove the plug in the encoder adapter. Install one of the metal parts of the three piece coupling to the wheel shaft and tighten it using a hex wrench. Next, install the center plastic piece on the wheel shaft coupling. Place the other metal coupling on the encoder shaft and set the encoder on the mount. Snug up the encoder coupling then remove the encoder and tighten the coupling.
Reinstall the encoder with o-rings and tighten it to the encoder mount. Next tighten the plug.

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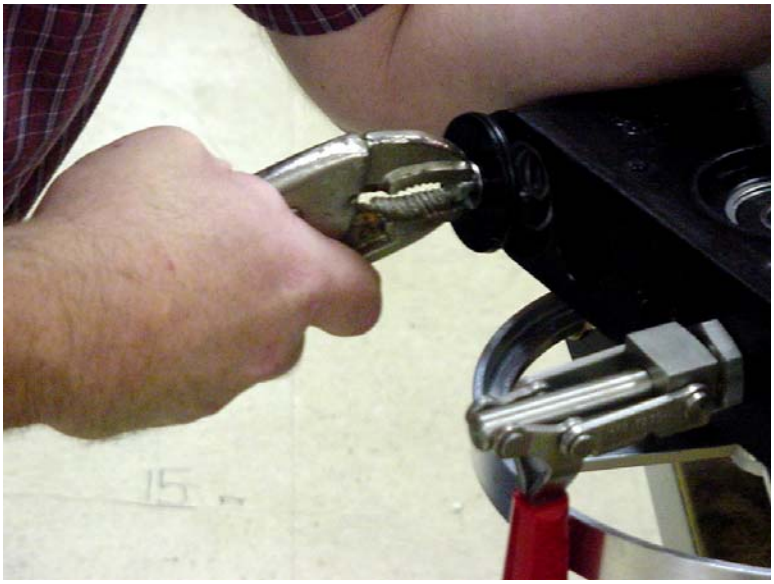
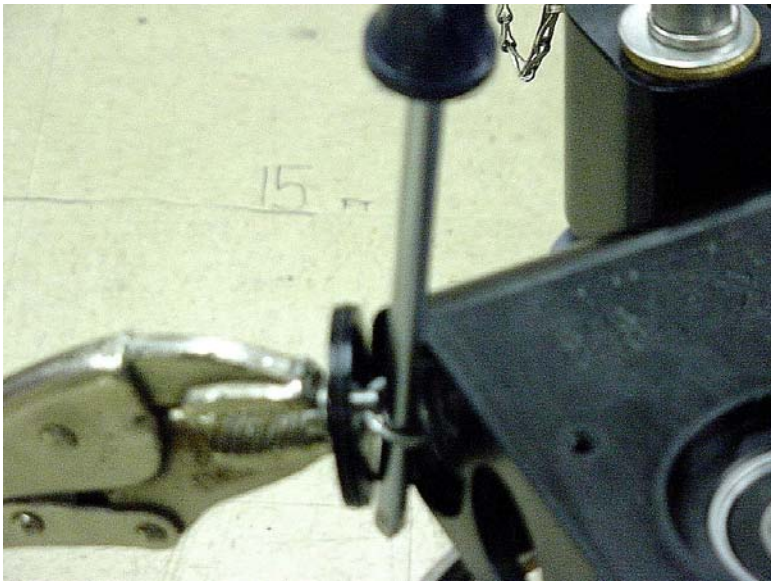
4.4.5 ENCODER MOUNT REMOVAL

Follow these steps to remove the encoder mounts.

1. Using a pair of vice grips, grab the end of the pin and pull on it (see photo).



2. Use a screw driver to capture the end of the spring (see photo).



3. The end cap and the pin can now be removed (see Photo)

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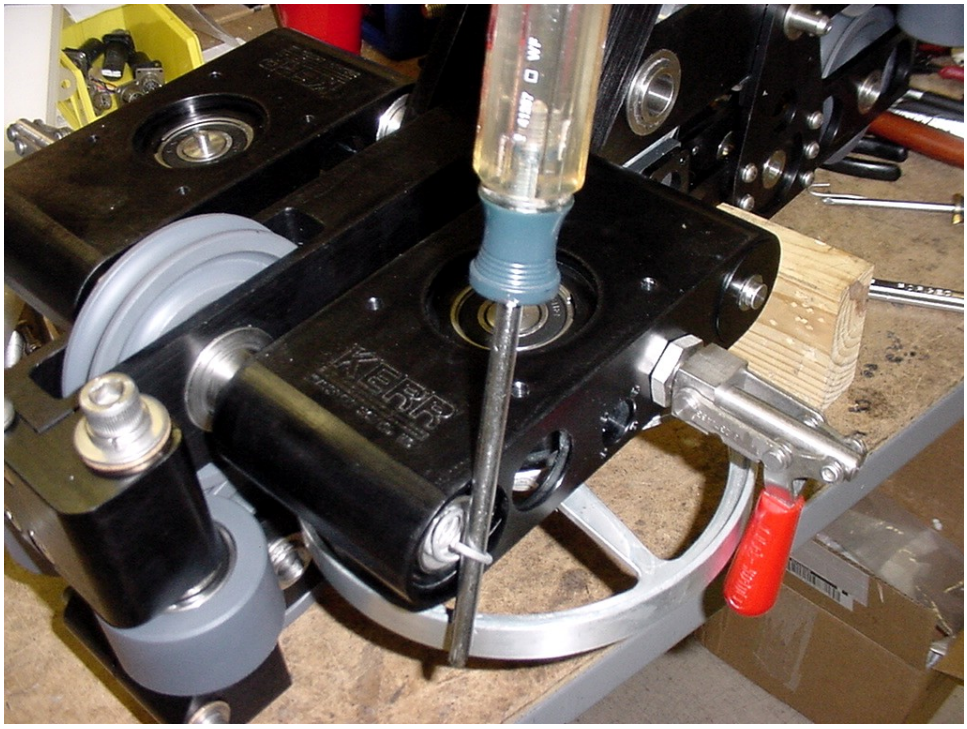

4 Use a hook to pull the spring out far enough to remove the screwdriver (Careful not to bend the spring).

5. Remove the floating encoder assembly.

6. Repeat for the other side.

7. Remove anti-rotation screw (if equipped).

8. Remove snap ring and pull out sliding shaft.

9. Remove the wheel assembly.

10. Re-assemble in reverse order.

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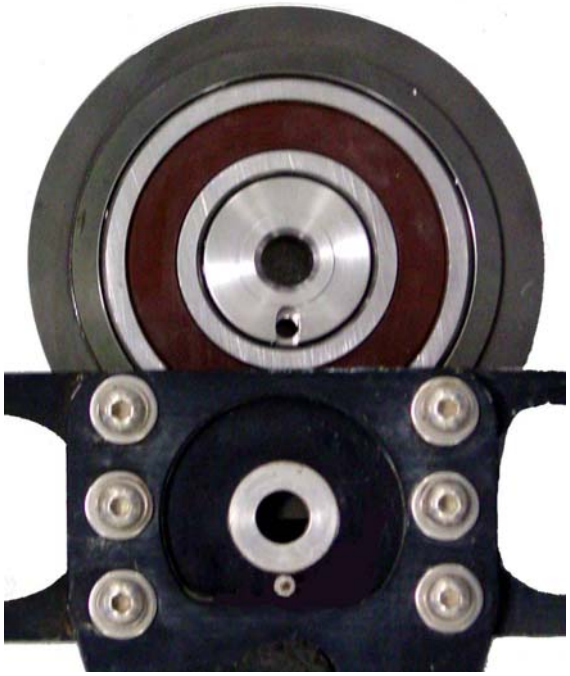
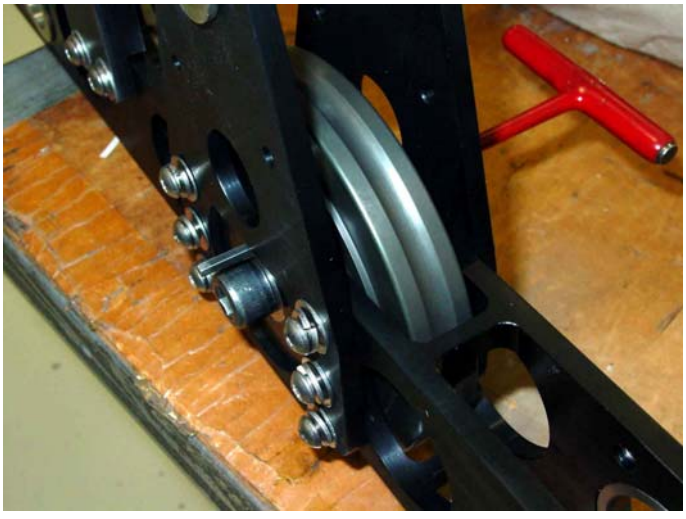
4.4.6 INSTALLING THE LOAD AXLE WHEEL

1. Insert the tension wheel into the frame. Make sure the slotted hole in the tension wheel bushing is on the same side as the roll pin hole in the frame.



2. Use a bolt in place of the load pin to hold it in place. Install an allen wrench or other long tool to align the hole in the bearing with the slotted hole in the frame.



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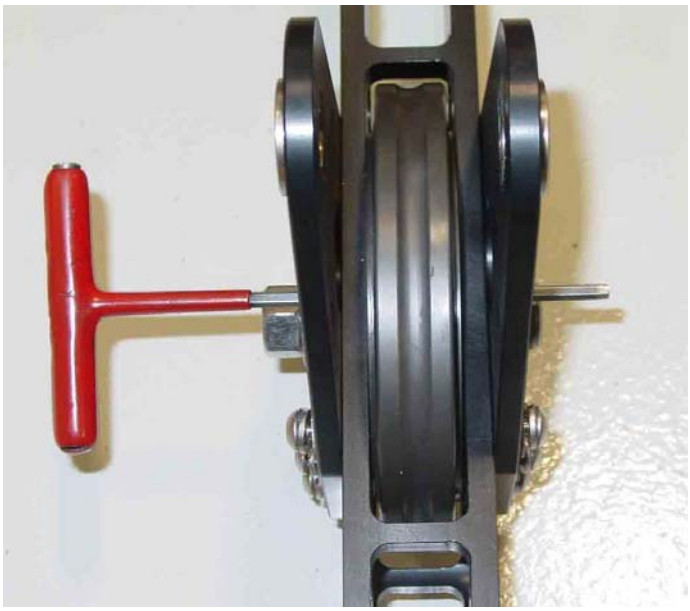

3. Insert a 3/16” x 1/2” long roll pin into the hole. Do not use a longer roll pin as it will put the wheel into a bind.

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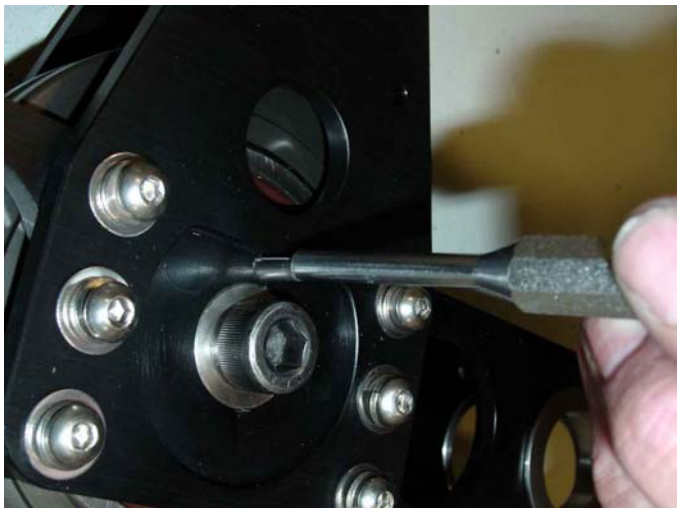
4. Drive the roll pin flush. Make sure that the wheel can freely slide up and down.



5. Remove the bolt and install the load pin.

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5.0 RECOMMENDED SPARE PARTS

It is recommended that the following list of parts be kept on hand for remote locations.

ITEM	KERR P/N	SAP P/N	DESCRIPTION	QTY	REF
10	AM5KA067	101392411	ASSY LOAD AXLE 2MV/V EEx nA	1	REPLACES AM5KA013
12	AM5KA066	101392415	ASSY MAG MARK DETECTOR EEx Na	1	REPLACES AMS1A039
13	AM5KA068	101392416	ENCODER HD2.5D-0-SS-1200- EEx nA	1	REPLACES AM5KP161
14	AM5KA058	101392417	ASSY BACKUP MAGNETIC EEx Na	1	REPLACES AM5KA055
22	AM5KM001	101393725	WHEEL MEASURING 2FT 5 SPOKE	2	SEE NOTE 1 BELOW
31	AM5KA137	101393735	ASSY WHEEL GUIDE PLAS 35MM BRG	4	SEE NOTE 2 BELOW
33	AM5KA063	101392449	ASSY WHEEL TENSN SHALLOW GROOVE	1	
33	AM5KA073	101393736	ASSY WHEEL TENSN DEEP GROOVE	1	OPTION (HI TENSION)
34	AM5KA164	101393737	ASSY WHEEL TENSN FIXD 35MM BRG	2	
35	AM5KA065	101392451	ASSY ROLLER SPOOLNG 2.75" PLAS	4	
36	AM5KM073	101392452	COUPLING MOD ENCDR 0.250/0.375	2	
51	AMS1P009	101392486	RETAINING PIN (T HANDLE)	1	
54	AM5KM157	101393742	BEARING BALL 35MM ID MOD	6	
55	AM5KP088	101392479	BEARING LINEAR 30MMID X 40MMOD	8	
56	C276P002	101392480	BEARING BALL 20MM FAFNIR 204PP	4	
58	AM5KM134	101393747	BEARING BALL 40MM ID MOD	1	
59	AM5KP001	101392483	CLAMP TOGGLE PUSH/PULL SST	1	
101	AM5KP130	101393769	NOZZLE GREASE FITTNG FLUSH	1	

NOTE 1:
Heads manufactured before Nov 2002 required the shaft to be replaced when the measuring wheels were replaced. All later model heads (SN 5K0229) and after come with keyed shafts that allow the wheel to be replaced without the shaft.

The P/N for wheel and shaft assembly is AM5KA025 (wheel and shaft without magnets - Encoder Wheel 1) and AM5KA060 (wheel and shaft with magnets - Encoder Wheel 2). If these P/Ns are ordered, they will automatically be supplied with the new keyed shafts. From that point forward, the AM5KM001 (101393725) wheels can be used.

NOTE 2:
Heads manufactured before Feb 2004 did not have greaseable bearings. We have since created a greaseable version for all 7 wheels. All later model heads (SN 5K0412) and after come with the greaseable bearings.

The top 4 wheels on both old and new heads are interchangeable with the new greaseable wheels. The bottom three plastic wheels in the old measuring heads are different then the wheels in new Measuring heads. The diameter of the wheel shaft is 20mm for the old measuring head and 35mm for the new measuring head.

- The P/N for this wheel assembly with the 35mm bushing is AM5KA139 (101414395)
- The P/N for the 20mm shaft is AM5KM012 (101414399)

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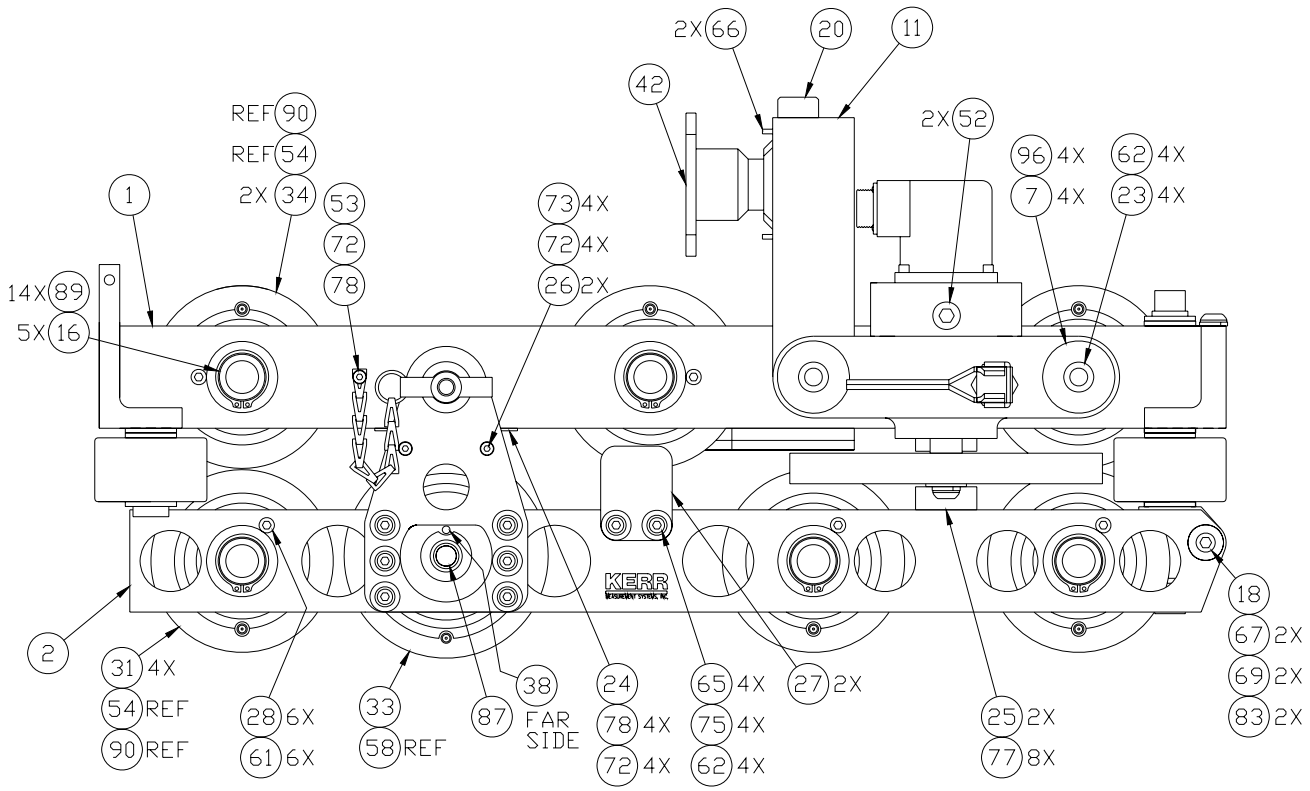
6.0 DRAWINGS AND PARTS LISTS

6.1 MEASURE HEAD ASSEMBLY

SIDE VIEW



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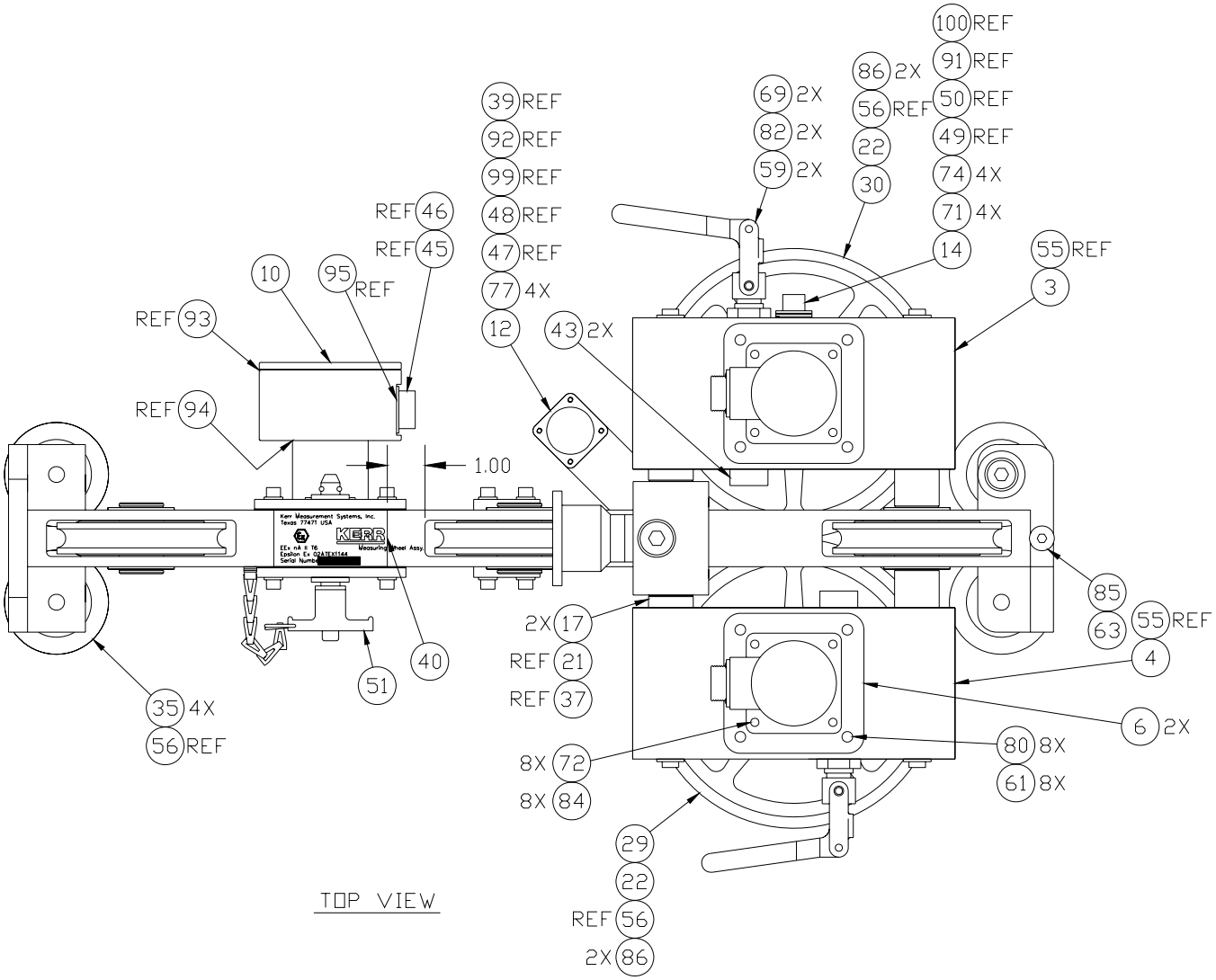
TOP VIEW



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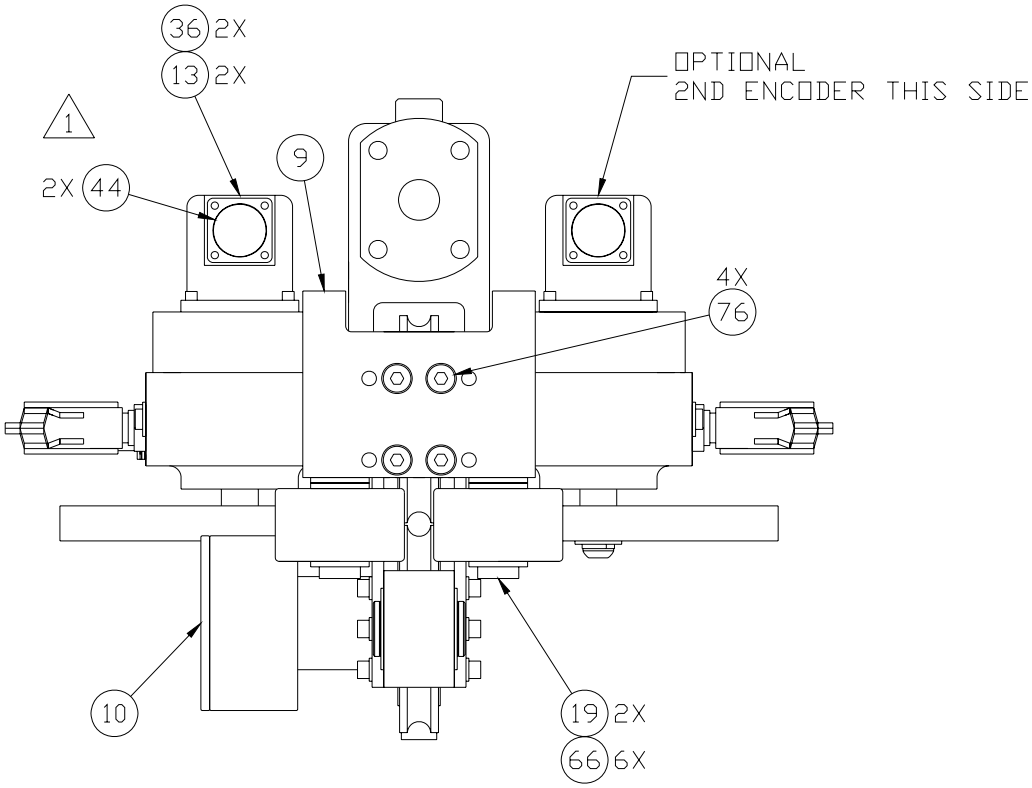
FRONT VIEW



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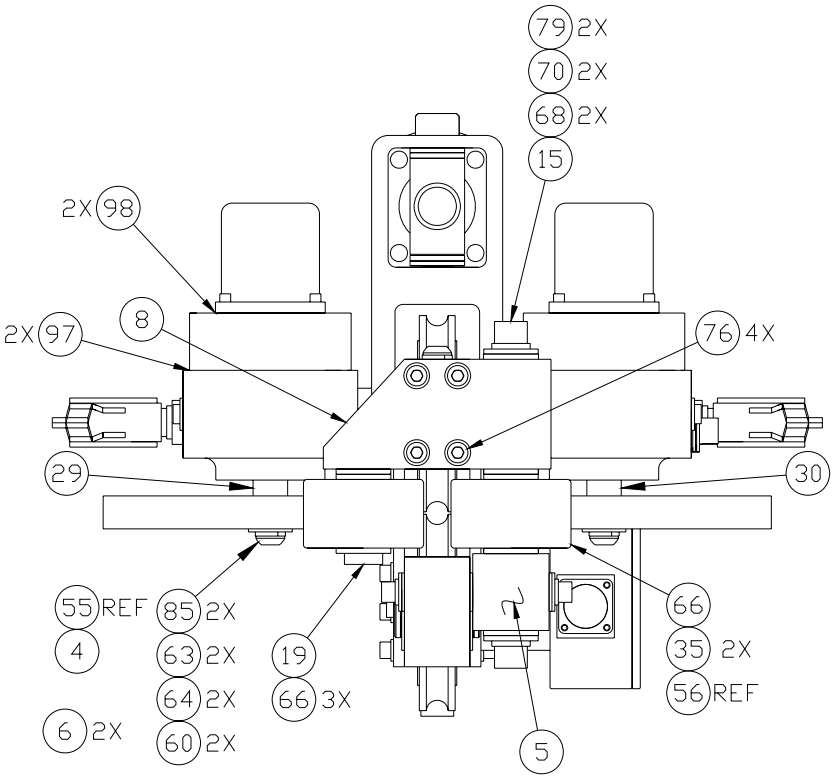
REAR VIEW



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PARTS LIST

ITEM	KERR P/N	SAP P/N	DESCRIPTION	QTY	REF
1	AM5KA131	101392401	ASSY FRAME BACKBONE UPPER 5WHL	1	
2	AM5KA232	101392402	ASSY FRAME BKBN LWR 5WHL GII	1	
3	AM5KA052-1	101392403	ASSY MOUNT FLTNG ENCDR WHL W/	1	OPTION
4	AM5KA052-2	101392721	ASSY MOUNT FLTNG ENCDR WHL W/0	1	
5	AM5KA053	101392404	ASSY BLOCK PIVOT HORIZ/VERT	1	
6	AM5KM057	101392405	ADAPTER ENCODER H37C/H25D	2	OPTION
6	AM5KM058	101393722	COVER ENCODER ADAPTER	1	OPTION
7	AM5KM020	101392408	ENDCAP FLOATING ENCODER MOUNT	4	
8	AM5KA057	101392409	ASSY MOUNT SPOOLNG ROLLR FRNT	1	
9	AM5KM026	101392410	MOUNT SPOOLING ROLLER REAR	1	
10	AM5KA067	101392411	ASSY LOAD AXLE 2MV/V EEx nA	1	REPLACES AM5KA013
11	AM5KA040	101393723	ASSY MOUNT CENTER YOKE 5 WHEEL	1	OPTION
12	AM5KA066	101392415	ASSY MAG MARK DETECTOR EEx Na	1	REPLACES AMS1A039
13	AM5KA068	101392416	ENCODER HD2.5D-0-SS-1200- EEx nA	1	REPLACES AM5KP161
14	AM5KA058	101392417	ASSY BACKUP MAGNETIC EEx Na	1	REPLACES AM5KA055
15	AM5KM024	101392418	SHAFT PIVOT VERTICAL 20MM SST	1	
16	AM5KM011	101392419	SHAFT TENSION ROLLER 30MM SST	5	
17	AM5KA059	101392423	ASSY SHAFT ENCODER SLIDE 30MM	2	
18	AM5KM023	101392424	SHAFT PIVOT HORIZONTAL 1/2 SST	1	
19	AM5KM013	101392425	SHAFT SPOOLING ROLLER 20MM	3	
20	AM5KP023	101392503	BOLT SHOULDER 3/4 X 3 SST	1	
21	AM5KP002	101392427	SPRING EXT 4" OAL 47/64 DIA SST	4	
22	AM5KM001	101393725	WHEEL MEASURING 2FT 5 SPOKE	2	
23	AM5KM141	101393727	ANCHOR SPRING 1/2" FLOATING	4	
24	AM5KM034	101392436	PLATE WEAR 1/16 X 1.5 X 3.5	1	
25	AM5KM049	101392437	BLOCK WEAR 1.50 X 1.50 X 0.56 STL	2	LARGE LINES
25	AM5KM074	101393728	BLOCK WEAR UPPER TOOL STL CH	1	SMALL LINES ONLY
26	AM3KM134	101393729	BLOCK WEAR 0.75 X 2.50 TOOLSTL	2	
27	AM5KM159	101393730	BLOCK GUIDE TENSION WHEEL PLAS	2	
28	AM5KM084	101393731	SCREW ANTI-ROTATION TENS WHEEL	6	
29	AM5KM010	101393733	SHAFT WHEEL CANTILEVERED 5 WHL	1	
30	AM5KM060	101393734	SHAFT WHEEL CANTLVRD MAG 5 WHL	1	OPTION
31	AM5KA137	101393735	ASSY WHEEL GUIDE PLAS 35MM BRG	4	
33	AM5KA063	101392449	ASSY WHEEL TENSN SHALLOW GRV	1	OPTION
33	AM5KA073	101393736	ASSY WHEEL TENSN DEEP GRV	1	OPTION (HI TENSION)
34	AM5KA164	101393737	ASSY WHEEL TENSN FIXD 35MM BRG	2	
35	AM5KA065	101392451	ASSY ROLLER SPOOLNG 2.75" PLAS	4	
36	AM5KM073	101392452	COUPLING MOD ENCDR 0.250/0.375	2	OPTION
37	AM5KP124	101393738	PIN COILED SPRING 1/4 X 1-1/8	2	ENCODER SLIDE
38	AM5KP125	101393739	PIN COILED SPRING 3/16 X 1/2	1	TENSION WHEEL PIN
42	AM5KM138	101393741	YOKE PIVOT CENTER MOUNT SST	1	
43	AM5KM040	101392459	PUSHROD TOGGLE CLAMP PLASTIC	2	
51	AMS1P009	101392486	RETAINING PIN (T HANDLE)	1	
52	AMS1P072	101392476	PLUG 3/8 NPT SS	2	

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53	AM5KP075	101392485	CHAIN SASH #35 SST	6	
54	AM5KM157	101393742	BEARING BALL 35MM ID MOD	6	
55	AM5KP088	101392479	BEARING LINEAR 30MMID X 40MMOD	8	
56	C276P002	101392480	BEARING BALL 20MM FAFNIR 204PP	4	
58	AM5KM134	101393747	BEARING BALL 40MM ID MOD	1	
59	AM5KP001	101392483	CLAMP TOGGLE PUSH/PULL SST	2	
60	AM5KM055	101393748	KEY 1/8 X 1/8 X 0.625L SST	2	
61	AM5KP144	101393749	WASHER 1/4 LOCK SS HIGH COLLAR	4	
62	ACMU2P31	101392487	WASHER 1/4 FLAT SS	8	
63	AMS1P058	101392488	WASHER 3/8 LOCK SS	3	
64	C276P513	101393750	WASHER 3/8 FLAT SST	2	
65	C276P036	101392496	WASHER 1/4 LOCK SS	4	
66	AM5KP011	101392497	WASHER 20MM FLAT SST	12	
67	C276P039	101393751	WASHER 5/16 FLAT SST	2	
68	AMS1P066	101392499	WASHER 1/2 LOCK SS	2	
69	AMS1P047	101392500	WASHER 5/16 LOCK SS	4	
70	C276P037	101392511	WASHER 1/2 FLAT SST	2	
71	C276P046	101393753	WASHER #6 LOCK SS	4	
72	C276P035	101392502	WASHER #10 LOCK SS	7	
73	AMS1P052	101392522	SCREW 10-24 X 5/8 SOC HD SST	4	
74	C276P331	101393754	SCREW 6-32 X 1/2 PHIL PAN SST	4	
75	AM5KP117	101392505	SCREW 1/4-20 X 5/8 BTN HD SST	4	
76	AM5KP038	101392506	SCREW 5/16-18 X 7/8 FH SOC SS	8	
77	AM5KP039	101392512	SCREW 10-24 X 7/8 FH SOC SST	2	
78	AM5KP040	101392513	SCREW 10-24 X 3/8 SOC HD SST	5	
79	AM5KP042	101392514	SCREW 1/2-13 X 3/4 SOC HD SST	2	
80	AMS1P048	101393767	SCREW 1/4-20 X 3/4 SOC HD SST	4	OPTION W/COVER
80	C276P031	101393767	SCREW 1/4-20 X 1-1/4 SOC HD SS	8	
82	AM5KP037	101392520	SCREW 5/16-18 X 4-1/2 SOC HD	2	
83	AM3KP028	101393756	SCREW 5/16-18 X 1/2 SHCS SST	2	
84	AMS1P052	101392522	SCREW 10-24 X 5/8 SOC HD SST	8	OPTION
84	AMS1P053	101392531	SCREW 10-24 X 2 SHCS SST	8	OPTION W/HD ENCDR
85	AM5KP043	101392523	SCREW 3/8-16 X 1/2 BUTTON HD	3	
86	AMS1P006	101392531	RING RETNG INT UR187S	4	
87	AM5KP033	101392532	RING RETNG EXT 0.500 SHAFT SST	1	
89	AM3KP018	101392534	RING RETNG EXT 1.188 SHAFT SST	4	
90	AM5KP168	101393762	RING RETNG INT 2.875 LT DUTY	12	
91	C276P041	101393763	O-RING 2-017 BUNA N	1	BACKUP HSG
92	AM5KP072	101392539	O-RING 2-046 BUNA N MMD COVER	1	
93	C276P040	101392540	O-RING 2-235 BUNA N L/P LID	1	
94	AMS8P066	101392541	O-RING 2-136 BUNA N L/P HSG	1	
95	AM5KP118	101392542	O-RING 2-023 BUNA N L/P CONN	1	
96	AM5KP020	101392543	O-RING 2-030 BUNA N ENDCAP	4	
97	AMS1P014	101392544	O-RING 2-152 BUNA N ENC ADPTR	2	
98	AM5KP071	101392545	O-RING 2-141 BUNA N H25 ENCDR	2	
99	AM5KP119	101392546	O-RING 2-026 BUNA N MMD CONN	1	
100	C276P042	101393764	O-RING 2-016 BUNA N	1	BACKUP CONN
101	AM5KP130	101393769	NOZZLE GREASE FITTNG FLUSH	1	NOT SHOWN

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6.2 MAGNETIC MARK DETECTOR SPECIFICATION

1. General

This specification describes the latest Kerr Measurement Systems magnetic mark detector. It replaces the original AMS100 detector, p/n AMS1A003. The performance characteristics emulate the original unit.

2. Mechanical

The mark detector will work in both the original housing p/n AMS1M022 and the AM5K versions using p/n AM5KM029. The pc board is potted to prevent damage from shock, vibration, or humidity.

3. Power

Input power is 9 - 30vdc at 100ma max.

4. Outputs

Digital line driver out for strong & strong\ and also weak & weak\ where a weak mark is 4 gauss or less and a strong mark is greater than 4.1 gauss measured 0.10 inch from cable surface. The signals are a +5vdc digital pulse. A digitized 0-5vdc representation of the analog signal is provided.

5. Performance

a) Operating temperature -40 to +120 f. compensated and stable. Storage temperature -60 to +180 f.

b) Magnetic mark detection at cable line speeds of 1 to 1000 feet per minute.

c) Auto cal feature removes offset of the electronics and any constant magnetic field less than 1 gauss every 100ms. If in a greater field, it will auto calibrate every 11 seconds.

d) Detection of apparent zero gauss (at high/low crossing) is within 0.1 inch and repeatable so as any error is not accumulative.

e) Will survive a gauss level exposure of 60 gauss.

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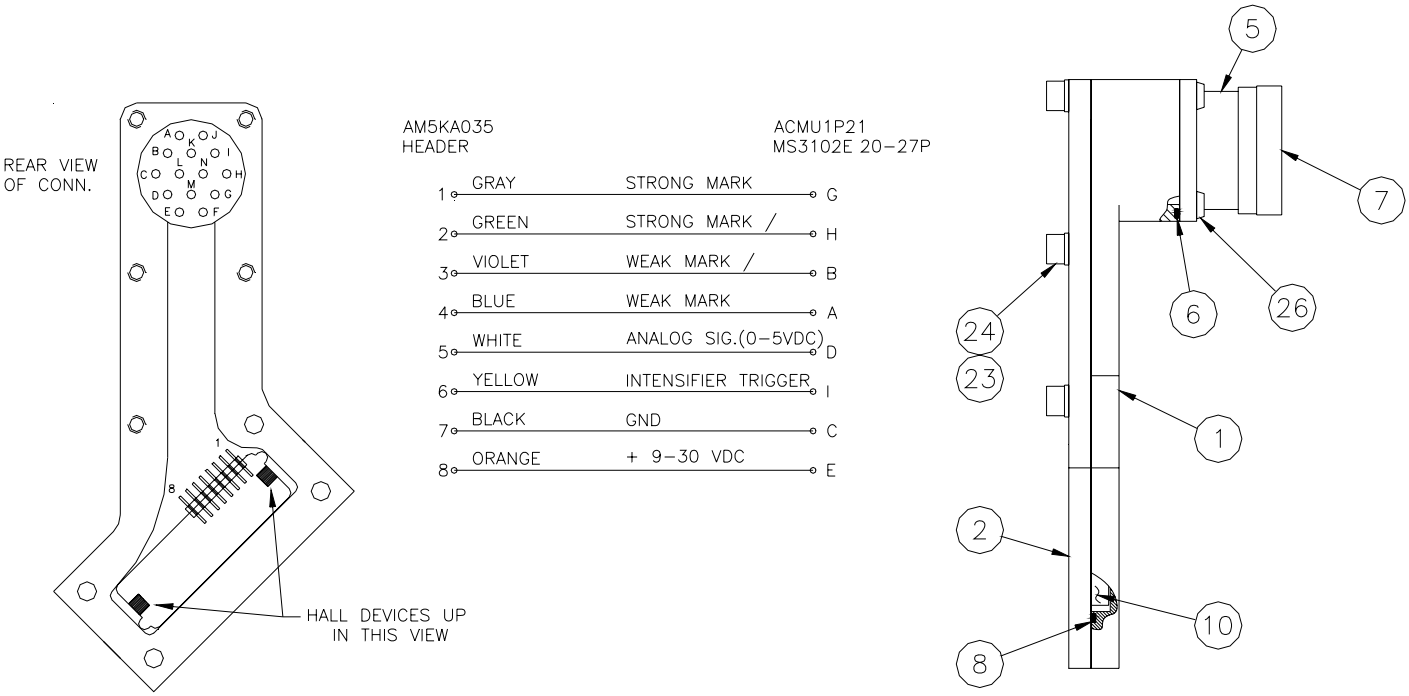

AM5KA066 (101392415) ASSY MMD EEx Na

1	AM5KM029	101392756	ENCLSR MAGNETIC MARK DETECTOR	1	EA
2	AM5KM035	101392757	COVER MAGNETIC MARK DETECTOR	1	EA
5	ACMU1P21	101392470	CONN MS3102E-20-27P 14 PIN RECEPT	1	EA
6	AM5KP119	101392546	O-RING 2-026 BUNA N MMD CONN 1-1/4 X 1-3/8 X 1/16	1	EA
7	ACMU1P22	101392471	DUST CAP MS25D43-20DA	1	EA
8	AM5KP072	101392539	O-RING 2-046 BUNA N MMD COVER 4.239ID X 4.3790D X 0.070	1	EA
10	AM5KA035	101392456	PCB MMD POTTED, AM5K OR AMS100	1	EA
23	C276P035	101392502	WASHER #10 LOCK SS	5	EA
24	AMS8P029	101392758	SCREW 10-24 X 1/2 SOC HD SST	5	EA
26	AMS1P040	101392504	SCREW 6-32 X 3/8 PAN HD SST	4	EA

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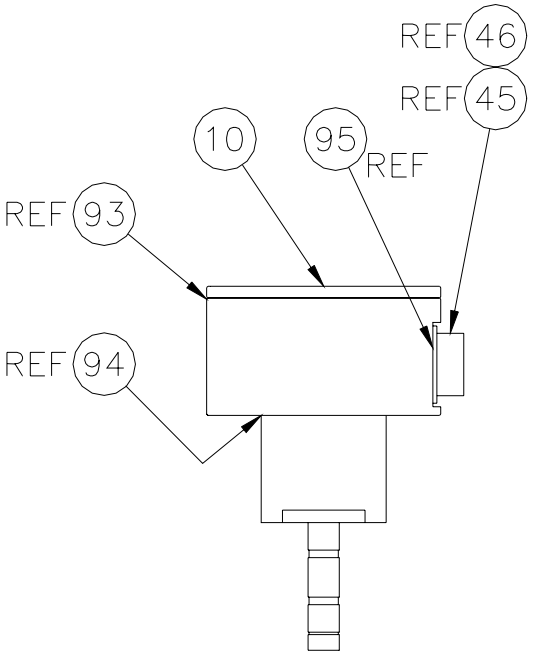
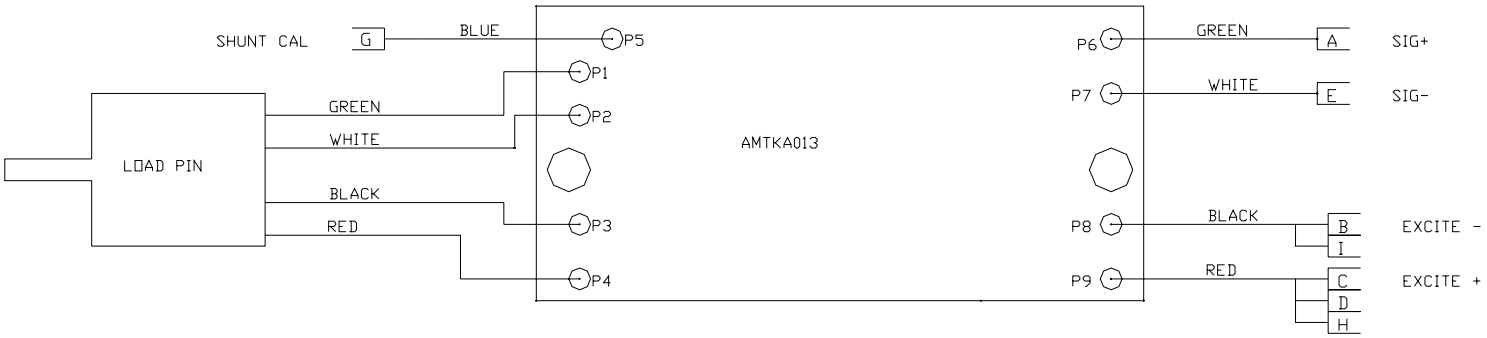
6.3 LOAD PIN



AM5KA067 (101392411) ASSY LOAD AXLE 3MV/V

45	AM5KP068	101392468	CONN 10-107218-1P BENDIX QWL COURSE THD 10 PIN	1	EA
46	AM5KP067	101392469	DUST CAP CW49N16C CANNON CWL COURSE THREAD	1	EA
93	C276P040	101392540	O-RING 2-235 BUNA N L/P LID 3-1/8 X 3-3/8 X 1/8	1	EA
94	AMS8P066	101392541	O-RING 2-136 BUNA N L/P HSG 1.98ID X 2.19OD X 0.103W	1	EA
95	AM5KP118	101392542	O-RING 2-023 BUNA N L/P CONN 1-1/16 X 1-3/16 X 1/16	1	EA



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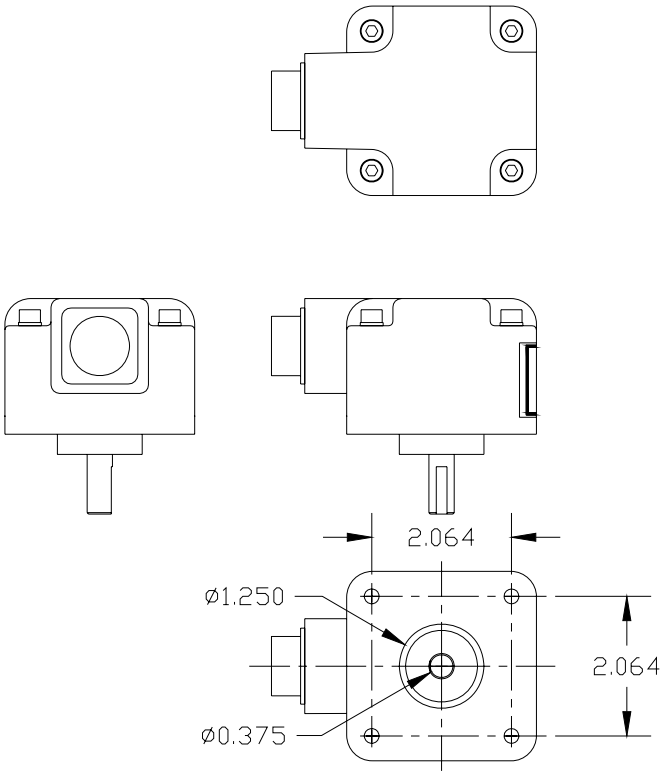
6.4 ENCODER



13	AM5KA063	101392416	ENCODER H25D-SS-1200-ABC-4469 EEx nA	2	EA
36	AM5KM073	101393736	COUPLING MOD ENCDR 0.250/0.375 BORE	2	EA
44	AMS1P071		DUST CAP MS25043-16DA (HES)	2	EA

Specifications

1200 Pulses per revolution
5 – 15 vdc power
Differential Quadrature output (A – A not, B – B not)

Pin Out

E - A
C - A\
G - B
D - B\
A - + 5v
B - Gnd
F - Case

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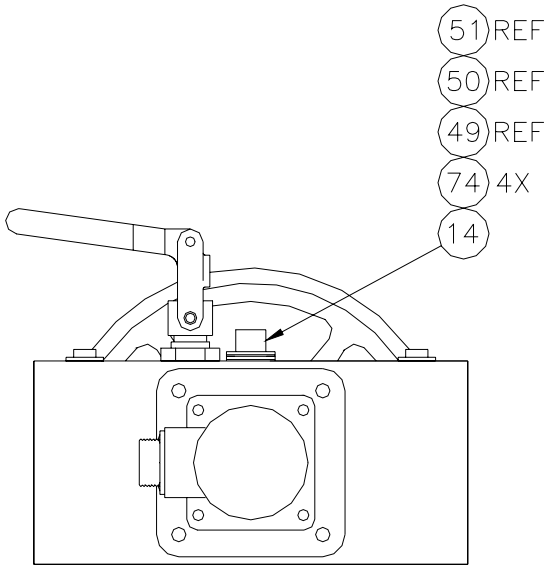
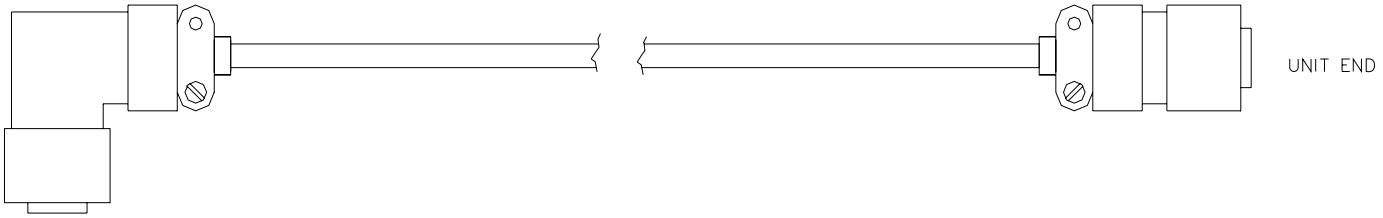
6.5 BACKUP ODOMETER CABLE AND WIRING



14	AM5KA058	101392417	ASSY ENCODER BACKUP MAGNETIC	1	EA
49	AM5KP027		CONN KPT02E10-6P RECEPTACLE MS3112	1	EA
50	AM5KP034		DUST CAP KPT8110C CANNON SHELL SIZE 10	1	EA
51	C276P041	101393763	O-RING 2-017	2	EA
74	AMS1P040	101392504	SCREW 6-32 X 3/8 PAN HD SST	4	EA

AM5KA024-20 BACKUP ODOMETER CABLE 101343792



1	AMS7P062		CABLE 24/2P STNDED TC PE/PVC AL/MY SHLD W/DW NEC CMUL2919	20	FT
2	AM5KP057		CONN KPT06F10-6P STR PLUG	1	EA
3	AM5KP058		CONN KPT08F10-6S RT ANGLE PLUG	1	EA
4	AM5KP059		DUST CAP KPT8010C CANNON	2	EA
5	AM5KA034		BUSHING #9779-513-4 AMPHENOL	2	EA

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7.0 CERTIFICATION DOCUMENTATION

7.1 MEASURING HEAD ATEX Conformity Certificate

Epsilon Compliance

ATEX Conformity Variation Certificate

Epsilon Certificate Number:

Epsilon 02ATEX1144/1

This certificate is issued for the following equipment:

5 Wheel Cable Measurement Device.
Inline Tension Device.

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Compliance and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:

ATEX Directive, 94/9/EC

Standard/s:

EN50021: 1999

Coding:

CE Ex EEx nA II T6

Project Number:

ETS0412

Issue Date:
01 November 2004

Report Number:

ETS(A)0412/B/1

On Behalf of Epsilon Compliance

S L D'Henin
Certification Manager

ASCB(E) Accrediting Certifying Bodies

This certificate may only be used in its entirety and without change

Ex

Epsilon Compliance (UK),
Drury Lane, Drury, Buckley, CH7 3DU, UK.
Telephone: +44(0)1244 541551
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1/2

KERR MEASUREMENT SYSTEMS, INC.
6415 Reading Road
Rosenberg, TX 77471
Phone: 281-342-6415
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Homepage: www.kerrms.com
E-Mail: mail@kerrms.com

7.2 MEASURING HEAD ATEX Conformity Schedule

Epsilon Compliance

ATEX Variation Conformity Certificate Schedule

Epsilon Certificate Number:

Epsilon 04ATEX1144/1

Variation 1 Description:

The 5 wheel measuring device range is extended to include the following versions:

- 512/780PPR 0-1.5V
- 2X1200PPR MS16 0-1.5V DIFF
- 2X1200PPR MS16 2.0mV/V

An inline tension device of the following types is included in the scope of the certificate:

- 0-1.5V DIFF
- 2.0mV/V

Drawings:

Number	Rev	Date	Title
AMTKA105	A	4/03	DEVICE ASY INLINE TENSION 0-1.5V DIFF EEx nA
AMTKA106	A	4/03	DEVICE ASSY INLINE TENISION 2.0 mV/V EEx nA
AM5KA107	B	4/03	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 2.0mV/V EEx nA
AM5KA110	B	4/03	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 0-1.5V DIFF EEx nA
AM5KA117	A	4/03	DEVICE ASSY 5 WHEEL 512/780PPR 0-1.5V EEx nA
AM5KA121	A	4/03	DEVICE ASSY 5 WHEEL BASE MODEL EEx nA
AM5KA507	A	8/04	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 2.0mV/V EEx nA GEN II
AM5KA510	A	8/04	DEVICE ASSY 5 WHEEL 2 X 1200PPR MS16 0-1.5V DIFF EEx nA GEN II
AM5KA517	A	8/04	DEVICE ASSY 5 WHEEL 512/780PPR 0-1.5V EEx nA GEN II
AM5KA521	A	8/04	DEVICE ASSY 5 WHEEL BASE MODEL EEx nA GEN II

Conditions of Certification:

None

Special Conditions of Certification:

None

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7.3 ENCODER ATEX Conformity Certificate

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon Ex 02ATEX1141

This certificate is issued for the electrical equipment:

Optical Encoder 1200 Pulse/Rev Ex

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:

CE Ex II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Epsilon Report Number:
ETS(A)0412/E/1

Issue Date: 22 May 2002

On Behalf of Epsilon Certification Service

S L D'Henin
Certification Manager

This certificate may only be used in its entirety and without change

Epsilon Technical Services Limited is certified against the requirements of ISO 9002 for assessment of products against EU Standards and Directives and is accredited for test and inspection by N.A.P.I.T. Epsilon is accredited as a Certification Body by the ASCB(E) (Accreditation Service for Certifying Bodies (Europe)).

Sheet 1 of 2

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7.4 ENCODER ATEX Conformity Schedule

ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1141

Equipment Description:

A heavy-duty solid shaft incremental optical encoder, designed to operate within an industrial environment. The encoder provides a 5 volt line driver output circuit with 1200 pulses per revolution, A, B and index channels including their complementary outputs via a plug and socket arrangement.

Drawings:

Number	Rev	Date	Title
100170-1	-	October 98	ETI Encoder board Schematic
AM5KM661	A	May 02	Label Encoder 5-15V EX

Conditions of Certification:

None

Special Conditions of Certification:

None

Epsilon Certification Service Limited
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7.5 LOAD PIN ATEX Conformity Certificate

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon Ex 02ATEX1142

This certificate is issued for the electrical equipment:

Load Axle 2MV/V EX

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

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Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:

II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Epsilon Report Number:
ETS(A)0412/B/1

Issue Date: 22 May 2002

On Behalf of Epsilon Certification Service

S L D'Henin
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7.6 LOAD PIN ATEX Conformity Schedule

ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1142

Equipment Description:

The load axle is a device used to translate force or weight into an electrical signal. The internal strain gauges change their electrical resistance in proportion to the strain placed on them. The resulting small signal is amplified and output as a voltage. This unit is constructed from high strength alloys.

Drawings:

Number	Rev	Date	Title
AWTKA013	A	October 01	Low voltage Load Cell Amp
AM5KM610	A	May 02	Lid Load Pin Housing MV/V EX
AMTKA014	A	August 01	0-1.5V Differential Tension

Conditions of Certification:

None

Special Conditions of Certification:

None

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7.7 MARK DETECTOR ATEX Conformity Certificate

epsilon3

ATEX Conformity Certificate

Epsilon Certificate Number:

Epsilon Ex 02ATEX1143

This certificate is issued for the electrical equipment:

Magnetic Mark Detector EX

Manufactured and submitted by:

Kerr Measurement Systems, Inc.
6415 Reading Road
Rosenberg
Texas 77471
USA

The equipment shall be designed and constructed in accordance with the specification set out in the schedule herein and documents referred to therein.

This Certificate is issued subject to the conditions of Epsilon Certification Service and any additional conditions as may be prescribed.

This Certificate does not imply that the equipment meets all statutory requirements in any particular industry or circumstance.

Directive/s:
ATEX Directive - EU 94/9/EC

Standard/s
EN 50021:1999

Coding:

CE Ex II 3 G EEx nA II T6

Epsilon Project Number:
ETS0412

Epsilon Report Number:
ETS(A)0412/C/1

Issue Date: 22 May 2002

On Behalf of Epsilon Certification Service

S L D'Henin
Certification Manager

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7.8 MARK DETECTOR ATEX Conformity Schedule

ATEX Certificate Schedule

Epsilon Certificate Number:

Epsilon Ex 02ATEX1143

Equipment Description:

The magnetic mark detector is a device which makes use of the Hall effect, for the purpose of generating a direct current voltage in the presence of a magnetic field, in this case a 5VDC electrical pulse. This unit operates between 9-30 volts DC with differential signals via a plug and socket arrangement.

Drawings:

Number	Rev	Date	Title
98600001	F	April 01	Mark Detector
AM5KM635	A	April 02	Cover Magnetic Mark Detector EX

Conditions of Certification:

None

Special Conditions of Certification:

None

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